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ABSTRACT

This report summarizes the evidence that family planning can reduce deaths of children under 5 years of age at a reasonable cost. The report also: (1) identifies the major reproductive factors associated with child mortality; (2) estimates the approximate reduction in child mortality that could be achieved through improved childbearing patterns; and (3) assesses the likely costs of preventing child death through family planning. A number of studies that analyzed the data of the World Fertility Survey, carried out in 41 countries, found 3 factors related to the risk of death in childhood. These factors are births spaced less than 2 years apart, births to mothers under 20, and first births. Possible biological causes of these three factors are examined. A number of studies have provided estimates of reductions in child mortality through alteration of childbearing patterns, such as increasing birth spacing and reducing births to women under 20 and over 34. Child mortality can be reduced through the use of contraceptives, the increased use of breastfeeding, oral rehydration therapy, distribution of vaccines for preventable diseases, and changes in family relationships through increased family planning. Costs of implementing family planning programs are estimated, and recommendations for family planning policy are offered. Ten references are cited. (BC)

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Family Planning and Child Survival

The Role of Reproductive Factors in Infant and Child Mortality

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Family Planning and Child Survival

The Role of Reproductive Factors in Infant and Child Mortality

An Analysis

by

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Family Planning and Child Survival

Introduction

It has long been recognized that the risk of maternal death in pregnancy and childbirth is closely linked to the timing and spacing of pregnancy. Studies generally show that the risk of maternal mortality is highest for adolescents and for women over the age of 35, for closely-spaced pregnancies, and for women who already have four or more children. This has led to the conventional wisdom that "too many, too soon, too late, too close" are the major risk factors in pregnancy and childbirth.

A growing body of research shows that some of these same risk factors for *mothers* also affect the survival chances of *children* in the first five years of life. Children born to mothers under 20 and those whose births are spaced less than two years apart appear especially vulnerable to death in infancy or early childhood. Since a sizeable proportion of births worldwide fall into these two categories, elimination of these high-risk childbearing patterns could significantly reduce the 14 million deaths that occur each year to children under the age of five, the vast majority in developing countries.

Mortality reduction through improved childbearing patterns is made possible by the increasing availability and acceptability of family planning in most countries. Moreover, existing data suggest that family planning is an affordable means of mortality reduction. Of course, family planning alone will not reduce child mortality to acceptable levels; ongoing immunization, diarrheal disease control and other primary health care programs must also be expanded, and special programs to combat problems such as acute respiratory infections initiated.

This analysis summarizes the evidence that family planning can reduce deaths to children under five at a

reasonable cost. It identifies the major reproductive factors associated with infant and child mortality; estimates the approximate reduction in child mortality that could be achieved through improved childbearing patterns; and assesses the likely costs of preventing a child death through family planning. What emerges is a compelling case for significantly increasing the priority and resources given to family planning within ongoing child survival efforts.

Reproductive Factors in Child Mortality: What We Know

Much of what is known about the relationship between childbearing patterns and child survival comes from the World Fertility Survey (WFS), a series of demographic surveys carried out in 41 countries during the mid-1970s and early 1980s which provides an extraordinarily rich and internationally comparable data base.

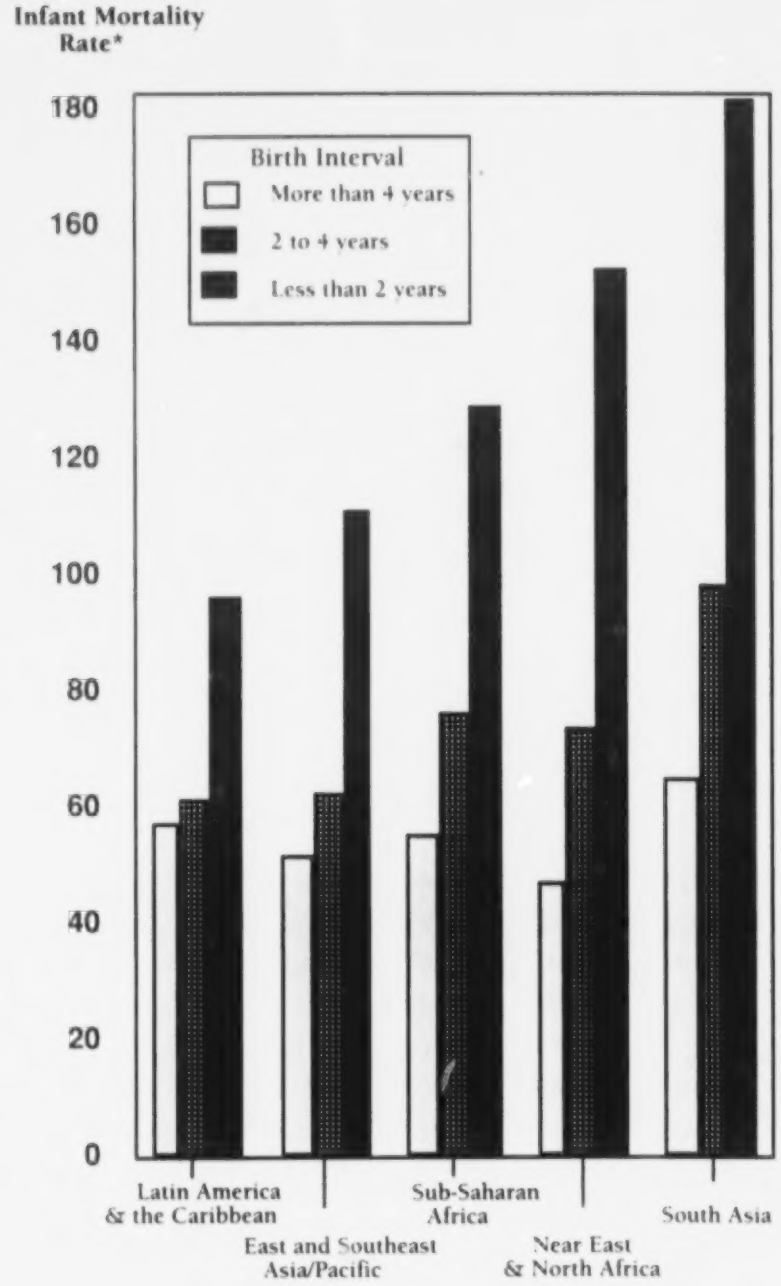
A number of studies have analyzed WFS data to explore the linkages between reproductive factors and infant and child mortality. The best known analyses include a recent study by Hobcraft (1987), and several previous studies by Hobcraft, McDonald and Rutstein (1985 and 1983.) These studies have received considerable attention on account of their methodological rigor and unparalleled coverage: their analysis includes 35 countries in all the major developing regions of the world.

In these studies, child mortality levels are compared for various groups. Controlling closely for other intervening variables, three reproductive factors are found to be strongly and consistently related to the risk of death in infancy or early childhood: *births spaced less than two years apart*; *births to mothers under 20*; and *first births*.

Of all the factors studied, *birth intervals* — that is, the period between one birth and the next — have the strongest impact on infant and child mortality. Birth intervals of less than two years are strongly and consistently associated with higher mortality. Both a badly-spaced prior birth and a

Figure I

Infant Mortality by Birth Interval (Years Since Previous Birth) — Averages for Selected Developing Countries by Region



*Infant deaths per 1,000 births

Source: George T. Acsadi and Gwendolyn Johnson-Acsadi, *Optimum Conditions for Childbearing*. London: IPPF, 1986. Based on data for World Fertility Surveys collected over the period 1974 to 1982.

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badly-spaced subsequent birth increase the risk of dying by age five. More specifically:

- A badly-spaced *prior* birth raises the risk of dying in infancy (i.e., before the first birthday) for the next child by about 60 to 70 percent, and the chances of dying before age five by around 50 percent.
- The effect of a badly-spaced *subsequent* birth is equally devastating to the first child; when the mother is recognizably pregnant by the child's second birthday, the child's overall chance of dying before the age of five increases to double that of children whose mothers have not yet conceived another pregnancy.

In other words, an interval of less than two years between two births has a negative effect on the survival chances of *both* children. Since these negative effects only come into play when the second pregnancy begins, the younger of the pair is likely to be more severely affected. Evidence from other country-specific and cross-national studies also supports the conclusion that, in almost all countries with moderate to high mortality, a short birth interval is strongly and consistently related to increased risk of death.

Children born to adolescent mothers also have a significantly greater risk of dying before their fifth birthday. Children born to mothers under the age of 20 are 34 percent more likely to die before the age of five than children born to mothers aged 25 to 34. The younger the teenage mother, the higher the mortality risk for the child; children born to mothers 17 and younger therefore represent a particularly high risk group.

Finally, *first-born children* are also at greater risk compared with second and third born children. The risk is highest (72 percent greater) in the first month of life, primarily reflecting the higher frequency of medical problems associated with a first delivery.

A combination of risk factors significantly increases the risk of death. For example, a first birth to a mother under 20 has an 80 percent greater mortality risk during the first five years of life than second or third children born to mothers aged 25 to 34. Also of concern are subsequent poorly spaced births to adolescent mothers; these children form a very high-risk group, with extremely poor chances of survival.

Compared to these risk factors, other factors important to maternal mortality, such as having many children or giving birth at an older age, are much less significant for child survival in most developing countries.

Maternal death itself is widely believed to increase mortality risks for children. However, there is surprisingly little research on the impact of a mother's death on the survival chances of her children. The empirical evidence is limited to a few small-scale studies in Bangladesh, but the results are devastating. In one study, only one fourth of infants whose mothers died giving birth were still living by their first birthday; in a second study, less than five percent survived to age one; and in a third study, all the infants died within the first month after birth.

These data suggest a strong relationship between maternal and infant deaths, operating perhaps through deprivation of maternal nutrition and care in early infancy. The death of a mother is likely to have tragic implications for the entire household, and for young children in particular. Nevertheless, maternal deaths probably account for only a small fraction of total childhood deaths. About half a million women die each year from causes relating to pregnancy and childbirth, compared with 14 million children under age five. Moreover, many of these maternal deaths, from causes such as septic abortion, obstructed labor, and toxemia, do not result in a live birth.

How Reproductive Factors Affect Child Mortality Risks: What We Don't Know

Although reproductive factors are strongly and consistently associated with child survival, the biological and social pathways through which these factors influence mortality are still unclear. Various theories have been proposed to explain these linkages.

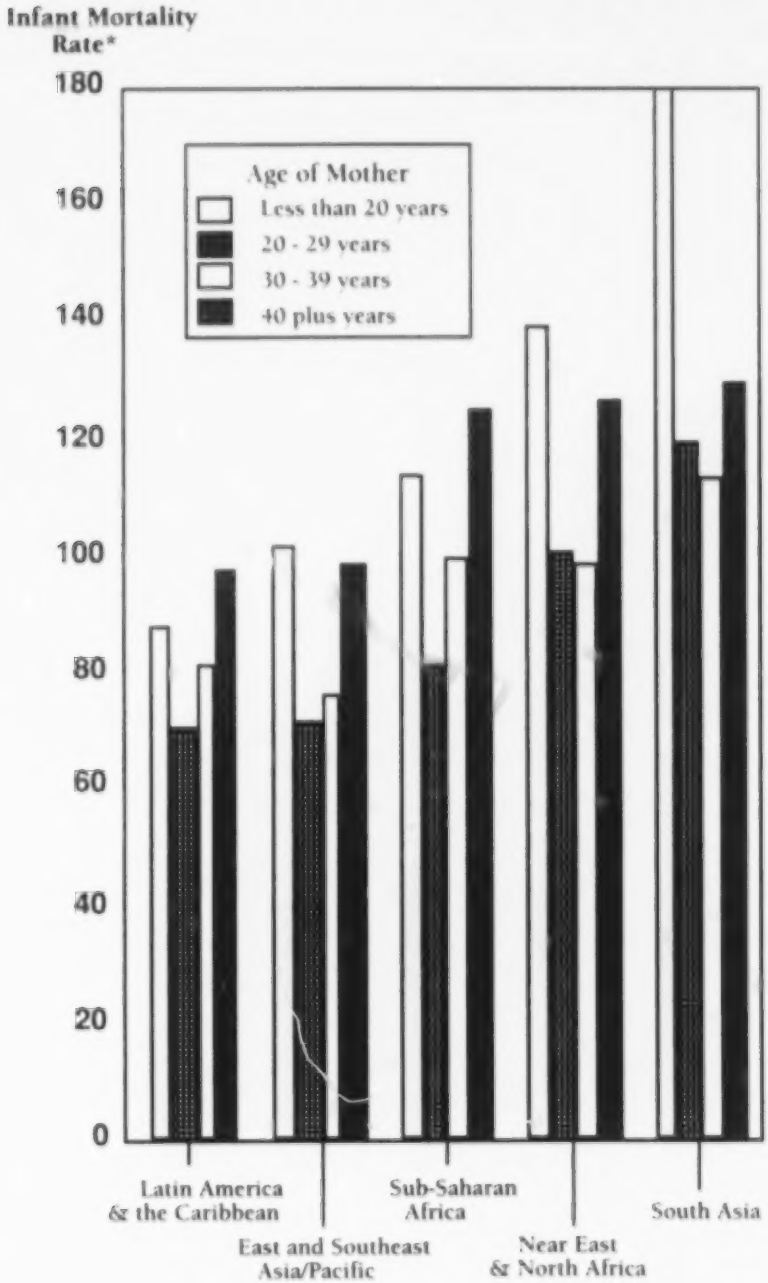
Birth Intervals: "Maternal depletion" is the most popular explanation for the increased risk to a child from a badly spaced preceding birth. Intuitively, as well as from a medical standpoint, maintaining a minimum gap between pregnancies makes good sense. Pregnancy and lactation make major nutritional demands on the mother. If a new pregnancy ensues with inadequate recovery time from the effects of a prior birth, this may increase the likelihood of prematurity and low birth weight, which are often associated with health problems in infancy and early childhood.

To some extent, extended birth intervals and breastfeeding work through each other to affect child survival. Breastfeeding enhances child health and, by often delaying the return of ovulation, can also help lengthen the interval between births. On the other hand, a poorly spaced subsequent pregnancy is often the cause of early weaning, with dire consequences for the health of the older child. Close spacing may also affect the quantity and quality of breast milk, and a woman's ability to breastfeed the new child.

Recent research, however, suggests that birthspacing by itself has a substantial effect on mortality, independent of breastfeeding or maternal health. One explanation is that short birth intervals increase competition among siblings of similar age for scarce family resources — not only food, but also maternal attention. Another less likely theory suggests that infectious diseases may spread more readily among a large number of young siblings in close physical contact.

Figure II

Infant Mortality by Age of Mother at Birth — Averages for Selected Developing Countries by Region

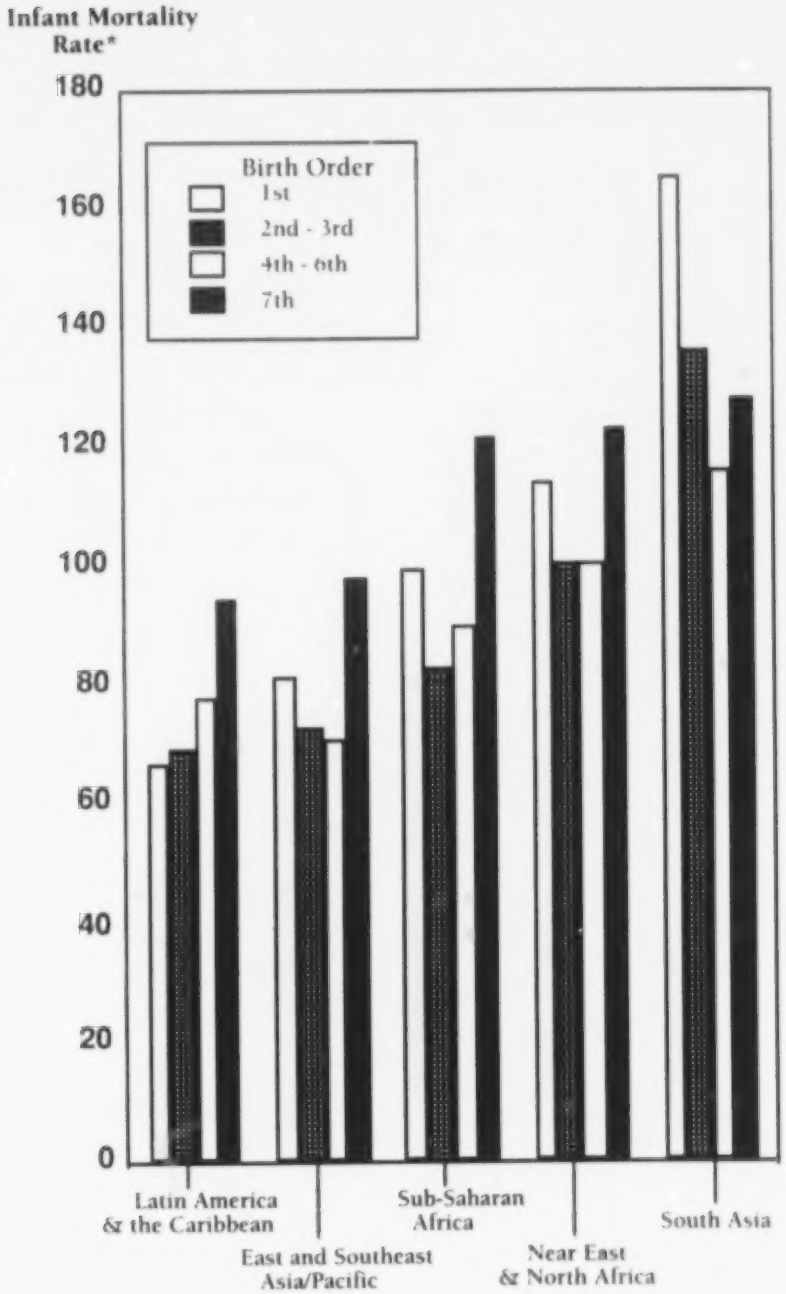


*Infant deaths per 1,000 births

Source: George T. Acsadi and Gwendolyn Johnson-Acsadi, *Optimum Conditions for Childbearing*. London: IPPF, 1986. Based on data for World Fertility Surveys collected over the period 1974 to 1982.

Figure III

Infant Mortality by Order of Birth — Averages for Selected Developing Countries by Region



*Infant deaths per 1,000 births

Source: George T. Acsadi and Gwendolyn Johnson-Acsadi, *Optimum Conditions for Childbearing*. London: IPPF, 1986. Based on data for World Fertility Surveys collected over the period 1974 to 1982.

Births to mothers under 20: From a biological standpoint, early childbearing is clearly hazardous for both mother and child. Studies show that infants born to adolescent mothers are more often premature and low in birthweight. Some of these increased risks are related to incomplete physical development of the mother. This is especially a problem in many poorer countries, where physical maturation occurs later than in most industrialized countries and where early marriage is often the social norm. In some societies, adolescents who become mothers tend to be socially, economically and environmentally disadvantaged, placing their children at even greater risk.

First births: The increased risk of infant mortality associated with first births is also largely due to biological reasons. For the most part, this risk is concentrated in the month after birth, reflecting difficulties encountered at the time of delivery. Clinicians have long recognized that women encounter more complications during their first birth compared with subsequent deliveries; moreover, some women who suffer special problems in childbirth will only discover these difficulties during their first delivery.

The evidence regarding the mechanisms through which reproductive factors affect child mortality is very limited. Further research is needed to clarify the reasons for this association, as well as the mechanisms through which young maternal age and short birth intervals interact with the more immediate causes of child mortality, namely, respiratory and diarrheal diseases.

Family Formation Patterns and Child Survival

Analyses of WFS data reveal that the timing of entry into motherhood, subsequent birth spacing patterns, and average completed family size interact to yield a striking diversity of family formation patterns. For example, only 3 percent of all births in Korea to women under 35 occur to adolescents, compared with 35 percent in Bangladesh. The proportion of first births to adolescent mothers also varies

greatly, ranging from 9 percent in Korea to 88 percent in Bangladesh. In general, with the exception of South East and East Asia, rapid early childbearing is still the norm in much of the developing world. In most countries which have been studied, second and subsequent births account for 35 to 50 percent of births to women under 20.

In a number of countries, a significant proportion of births occur to mothers 17 years or less. In Bangladesh, this highest-risk young teenage group accounts for over a fifth of all births to women under 35. Other poor countries, especially in Africa, have more births to this younger teenage group than to older adolescents.

Patterns of child spacing also differ substantially. In Senegal, Lesotho and Korea, fewer than one quarter of all births are spaced less than two years apart. In Jordan, Colombia and several other countries studied, over one half of all births are poorly spaced involving intervals of less than two years. Poor spacing is much more common among younger mothers; second and subsequent births to teenage mothers are especially likely to be closely spaced. In some Latin American and Near Eastern countries, an astonishing 70 percent of all second and higher births to teenage mothers are poorly spaced.

The various family formation patterns can be grouped in terms of "reproductive pace," that is, the average number of children mothers have borne by a certain age. At one end of the spectrum are developing countries where a late start to childbearing, small family size and good birth intervals combine so that the pace of childbearing is "slow." Countries in East and South East Asia, such as Korea, fit this pattern. At the other end of the spectrum are countries where very early initiation of childbearing, short birth intervals and large family size combine for a relatively "fast" reproductive pace. This pattern is common in a number of Middle Eastern and North African countries and in some urban areas in Africa where traditional child spacing customs are rapidly declining.

These overall patterns of reproductive behavior have significant implications for child survival. As would be expected, a slow pace of reproduction is generally associated with lower child mortality risk, and a fast pace with above average risk. The proportion of births in the highest risk categories — poorly spaced births to teenage mothers and mothers with a higher than average number of children for their age — also varies substantially, with a high of 28 percent for Jordan and a low of 1.5 percent for Korea. (Jordan has the shortest average birth intervals of all the countries studied.) In very few countries studied, however, do high-risk births account for less than 10 percent of all births.

Countries with a high proportion of births at very short intervals have significantly elevated "excess" mortality risks. In Jordan, a full third of all second and higher births are spaced less than 18 months apart; for these children, there is at least a tripling of mortality risk. Less extreme forms of this pattern are common elsewhere in the Near East and Latin America.

Child mortality rates tend to be highest in sub-Saharan Africa and South Asia. In both regions, however, traditional practices such as prolonged breastfeeding, and in parts of Africa, long periods of postpartum sexual abstinence, have helped to maintain reasonable birth intervals. These traditional child spacing practices have helped to protect countries in these regions from the higher levels of mortality that would occur with shorter birth intervals. What is clear, however, is that widespread erosion of traditional postnatal restraints on fertility, without a compensating increase in contraceptive use, will have dramatic consequences. For example, if Lesotho with its relatively well-spaced births were to adopt the reproductive patterns of Jordan, child mortality could rise by as much as 30 percent.

The Potential Impact of Improved Childbearing Patterns on Child Mortality

Efforts to estimate the aggregate effects worldwide of changes in reproductive patterns on child mortality are difficult. The increased risks to individual children from early childbearing and short birth intervals are beyond doubt. However, the great variations across countries in reproductive behavior and mortality make it difficult to measure the overall effects of changes in childbearing patterns on child mortality.

One problem is that as average family size declines, there is a purely mechanical rise in the *proportion* of first births, which are at inherently higher risk. As a result, while the number of child deaths may decline, the *aggregate mortality rate* may remain stagnant or even increase as fertility falls. Changes in breastfeeding behavior represent a second set of confounding factors. In some countries, the positive spacing effects of increased contraceptive use are offset by the fact that as societies modernize, mothers breastfeed for shorter periods or not at all, resulting in shorter birth intervals among women not using effective contraception.

Data on infant mortality are also imprecise. However, it is widely accepted that about 10 million infants under the age of one and about 4 million children aged one to five die each year, for a total of 14 million child deaths annually. In this section, we use estimates in various studies of the potential for mortality reduction through improved childbearing patterns to calculate the number of child deaths which could be prevented. Such estimates are necessarily speculative, but the results are striking.

- In a classic 1984 study, Trussell and Pebley estimate that simply improving birth spacing patterns, so that all births are spaced at least two years apart, would lower infant mortality by 10 percent and child mortality by 21 percent in 25 countries studied. Applied to current mortality,

eliminating this one risk factor would represent a reduction of 1.8 million infant and child deaths each year.

- Trussell and Pebley also estimate that eliminating births to women under 20 and over 34 would reduce infant and child mortality by about 5 percent, and eliminating fourth and higher order births would reduce infant and child mortality by about 8 percent. This represents a reduction of 700,000 and 1.1 million deaths respectively. (Unfortunately, the results are not wholely additive to those above.)
- Using a somewhat different approach, Maine and McNamara (1985) estimate that, if all children were born after an interval of at least two years, on average one out of five infant deaths would be averted. The potential reduction in infant deaths would range from 5 percent in Senegal to as high as 40 percent in Jordan. This formula would suggest a 2 million reduction in infant deaths alone. (The authors did not make any estimate for reduction in child deaths.)
- Hobcraft (1987) applies the favorable pattern of childbearing in Korea to the other countries in his analysis, concluding that mortality gains would range from a 10 percent reduction in Senegal, which still benefits from traditionally long birth intervals, to as high as 30 percent for Jordan. In all the Latin American and Caribbean countries studied, overall child mortality could be lowered by up to 20 percent. At a 20 percent average mortality reduction across countries, the number of infant and child deaths averted under this formulation would be at least 2.8 million.

These studies focus on different reproductive factors and measures of mortality. However, when their findings are applied to actual mortality data, they are remarkably

internally consistent in the range they suggest for potential mortality reduction. Overall, they suggest that when interval, maternal age and birth order effects are combined, mortality reduction is most likely in the range of 20 to 25 percent. This conclusion is consistent with empirical data that suggest that about one quarter of the decline in infant and child mortality rates in many developed countries occurred because of changes in patterns of child bearing; the impact of such changes can be much greater in developing countries where a larger proportion of births involve greater risk to mothers and their infants. This is also consistent with country-level studies which suggest that the interval effect alone can potentially reduce infant mortality by 15 to 20 percent.

A 20 to 25 percent reduction in infant and child mortality would yield an overall reduction in child deaths of between 2.8 and 3.5 million a year. A reasonable estimate is thus that *substantially improving childbearing patterns through family planning could lead to a reduction of about 3 million infant and child deaths each year.*

This estimate is confined to the reduction in child deaths reflecting lower death rates arising from changes in childbearing patterns. The number of deaths prevented would be substantially higher if it also included the reduction in the number of births commensurate with current family size ideals. Survey after survey has shown that roughly half of all women in developing countries do not want any more children, suggesting enormous potential to avoid additional child deaths simply by preventing unwanted births. If the average birth rate in developing countries were cut in half, from 31 to 15 births per 1000 population per year, average family size would fall to about two children — about replacement level. The annual number of births would be roughly halved, and, even assuming constant death rates, over time about half the current 14 million annual child deaths would be avoided.

Family Planning: An Essential Element in Child Survival

There is definite potential for reducing infant and child mortality through increased use of contraception. Increased contraceptive use is closely linked to better childbearing patterns, which in turn directly contribute to improved child survival. Family planning has a special contribution to make in reducing the number of births that pose special risks, and can also reduce the overall number of births — and therefore deaths. The mortality reducing effect of family planning is most important among women who use contraception to delay or space births and to prevent high-risk births.

It is clear that breastfeeding can also play a role in some countries in maintaining longer birth intervals, and that erosion of such traditional spacing practices could have a significant unfavorable impact on fertility and mortality levels. Nevertheless, the contraceptive effects of breastfeeding must not be overstated. Recent studies have shown that breastfeeding is only reliable as a contraceptive when it is intensively and exclusively practiced. Moreover, while the optimal interval between births is two years or more, breastfeeding typically provides contraceptive protection for only four to six months after birth. Effective methods of contraception must be used starting no later than six months after birth. It is therefore important to recognize that mortality reduction through better birth spacing cannot be realized through breastfeeding alone, and that *birth spacing implies a central role for safe and effective contraception.*

The potential for family planning to reduce deaths is as large as for other child survival technologies; for example, it is estimated that the lives of 2.5 million children could be saved each year through oral rehydration therapy, and that almost three million children die each year from vaccine preventable disease. Studies in Malaysia and Guatemala have shown that increasing the interval between births has about the same level of effectiveness in reducing child mortality as

giving birth in a hospital and living in a village with a primary health care facility. It appears to have a greater impact than three years of maternal education or having toilet facilities in the household.

Finally, it is possible that increased family planning practice can improve child survival by promoting changes in family relationships. Recent thinking on the relationship between family planning and infant mortality looks beyond the purely demographic effects to parenting practices and the affective relationships between a mother and her children. The hypothesis is that a significant decline in average family size can have a dramatic impact on family dynamics. One analyst has gone so far as to argue that the association between mortality level and family size in south India reflects fundamental changes in family relationships resulting from lower fertility.

The Costs of Family Planning as a Child Survival Intervention

There is good reason to believe that, as an intervention for mortality reduction, family planning is inexpensive.

The average cost of family planning programs is about $16 per fertile couple per year, or $1.50 to 2.00 per capita. These costs include not only contraceptive commodities, but education and counseling, salaries and training for medical personnel, and the research programs needed to evaluate and improve family planning efforts.

Actual contraceptive costs vary widely from country to country and by contraceptive method and service delivery channel. The purchase cost of a top quality IUD which provides six years of safe, reliable protection, for example, is as little as $1.00; even including service delivery costs, the cost of providing one year's protection is relatively low. The cost of distributing contraceptives through commercial outlets is often less than $2 per couple per year. Clinical and community-based outreach programs tend to be more costly.

There are considerably fewer data on the cost of preventing a child death through health care interventions. The costs vary widely depending on the pattern of infant and child deaths in a country as well as the type of intervention. A conservative estimate is that averting a death through selected primary health care interventions costs about $200 to $250.

In order to space births a minimum of two years apart and thus reduce the risk of infant and child death from one of several risk factors, a couple must use effective contraception for at least 15 months after the birth of a child. (This assumes a couple serious about birth spacing would not rely solely on breastfeeding to provide contraceptive protection, even in the early months postpartum.) If the average cost of a year's contraceptive protection is $16, then the average cost of 15 months contraception, or maintaining a birth interval of at least two years, would be $20. *In other words, a mere $20 spent on safe and effective contraception for birthspacing can prevent a badly timed pregnancy that would substantially increase the risk of an infant or child death.*

Estimating the cost of delaying an adolescent pregnancy is more difficult, since it will depend on the average age at first birth in a particular country and the period of time for which contraception would be needed. In general, postponing a first birth is likely to require somewhat longer contraceptive use and cost slightly more than spacing a subsequent birth.

Policy Implications

Looking at family planning as a child survival intervention provides fresh guidance for both family planning and child survival efforts.

First, it suggests a need for family planning programs to give greater attention to spacing methods than has traditionally been the case. Country programs which emphasize more cost-efficient permanent or long-acting contraceptive methods need to ensure adequate accessibility

to temporary spacing methods, such as birth control pills, IUDs, condoms and other barrier methods. A new emphasis on spacing methods may even advance family planning success by reaching new groups of younger clients.

Second, family planning activities should play a more central role in child survival programs. There is a clear need to build on the synergy between family planning and child health programs. Throughout the developing world, for example, visits to clinics for infant immunizations provide a perfect and largely unutilized opportunity to promote family planning for improved birth spacing and child survival. Increased attention should be given in community health education efforts to raising awareness of the dangers of early childbearing, particularly among parents of adolescent girls and young newly married couples. The media and health workers also need to provide appropriate guidance on breastfeeding and contraception.

Finally, at the organizational level, a common approach is needed so that family planning and child survival programs are perceived as complementary interventions. At the country level, national health and family planning agencies need to emphasize the mutuality of their goals and to improve coordination of their activities. The major international donors working in health and family planning must also speak with one voice to national governments on the importance of family planning for child survival.

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ABOUT PCC

The Population Crisis Committee (PCC) is a private non-profit organization. PCC seeks to stimulate public awareness, understanding and action towards the reduction of population growth rates in developing countries through voluntary family planning and other actions needed to solve world population problems.

PCC today undertakes a variety of activities; particularly, it:

- Educates key U.S. leaders about the urgency of international population problems.
- Provides authoritative analysis of the impact and importance of U.S. policies and financial support for international population assistance programs.
- Through provision of information and direct meetings with the highest government and private leaders in developing countries, encourages adoption of more effective programs to reduce population growth.
- Identifies and supports innovative, cost-effective and replicable family planning projects at the grassroots level in developing countries with the most serious population problems.
- Works through the U.S. media and other organizations to enhance public understanding of the importance of the world population problem and of U.S. assistance to population programs in developing countries.
- Prepares studies and reports on critical population issues and distributes them to some 65,000 policymakers and opinion leaders worldwide.